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B592: Handling and Processing Broilers in Maine: Part 1—Costs and Efficiencies in Assembling Live Broilers for Processing

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Handling and Processing Broilers in Maine

Part 1 -- Costs and efficiencies in assembling live broilers for processing

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CONTENTS

SUMMARY

This study is an analysis of the operating statements of three broiler processor-truckers and of time and cost studies of the assembly operations of three processors involving 42 farm pick-ups.

The assembly operation, as referred to in this study, includes travel from plant to the farm and return, loading the birds at the farm, and waiting or idle time. Unloading the birds at the plant was not included as part of the assembly operation.

The average cost of assembling live broilers for the three operations studied was 1.99 cents per bird or .60 cent per pound live weight. A breakdown of the per bird assembly costs showed that an average of 1.02 cents was for labor, .72 cent for motor vehicle expense, .05 cent for buildings and equipment, .06 cent for coops, and .14 cent for miscellaneous items. Variations in the cost of assembling broilers ranged from 1.55 to 2.39 cents per bird.

Time study observations on 42 farm pick-ups showed that an average of 7.0 man-hours were spent on travel, 3.4 man-hours on loading, .9 of a man-hour in waiting, and .1 of a man-hour on miscellaneous duties.

Three types of motor vehicles were used in the assembly operations studied. They were: (1) platform trucks with a capacity of 192 crates, (2) a tractor semi-trailer combination with a capacity of 320 crates, and (3) a "carry all" used to transport the crew. Motor vehicle costs averaged .72 cent per bird and amounted to 36 per cent of the total assembly costs. On a per mile basis, vehicle costs averaged 24.5 cents. Of this total, variable costs were 15.9 cents per mile and fixed or overhead costs averaged 8.6 cents per mile.

Factors affecting assembly costs were crew organization, type of broiler house, load-out facilities, size of flock, and distance from plant to farm. The foreman was an important factor in determining the efficiency of the crew. One and two story broiler houses, with two by three foot load-out doors located at least every 12 feet along load-out side of the building, were found to be the most efficient from the standpoint of loading birds at the farm. Assembly costs were lowest for large flocks located near the processing plant.

Farm to plant shrink of broilers averaged 1.27 per cent and did not increase appreciably up to 50 miles.

Assembly costs could be reduced by (1) employing a fore-

man who knows the assembly operation and is able to teach and supervise others, (2) selecting one and two story houses that have a capacity of over 20,000 birds, (3) having load-out doors two by three feet in dimension located at least every 12 feet along load-out side of building, and (4) selecting farms within a 35 mile radius of the plant.

The cost of assembling birds on farms with the most desirable features averaged 1.49 cents per bird as compared with an average for all lots of 1.99 cents.

HANDLING AND PROCESSING BROILERS IN MAINE

Part 1. Costs and efficiencies in assembling[1] live broilers for processing.

LLOYD J. JEWETT[2]

INTRODUCTION

Processor-truckers are faced with the problem of how to move live broilers from the farm to the plant at lower cost and with less bruising. During recent years substantial improvements in efficiency have been made in assembling broilers. These improvements have reduced costs considerably. They include concentration of growing area, country-point processing, larger flocks, volume handling on a continuous basis, and the integration of growing and processing. Such practices as bulk weighing and on-the-truck crating are now common in Maine.

In spite of these improvements there is still considerable potential for further cost reduction in the broiler assembly operation. Small flocks housed in buildings with inadequate load-out facilities and located long distances from the plant are frequently found in Maine and other broiler areas. Often assembly crews are not given adequate training and in some instances are not supervised properly. The above conditions contribute to high assembly costs.

Purpose of the study

This study was designed (1) to determine the costs and man-hour requirements for assembling live broilers, (2) to determine the importance of factors affecting assembly costs and labor requirements, and (3) to find ways of improving present conditions. An attempt was made to measure the effect of various types of broiler houses, load-out facilities, flock size and distance from farm to plant. Also an attempt was made to determine the effect of assembly crew organization on man-hour requirements and cost of assembling live broilers.

Method and scope of study

Time and cost data were obtained on the assembly operations of three broiler processors. Forty-two farm pick-ups were closely studied

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[1] The information contained in this report was presented as a thesis to the Graduate School of the University of Maine, May 1959, in partial fulfillment of the requirements for the degree of Master of Science.

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from the time the crew left the plant, picked up birds on the farm, and returned to the plant. The 42 farm pick-ups were randomly selected from within stratifications which included type of building, type of load-out facilities, size of flock, and distance from farm to plant. A breakdown of the time required for travel, loading, waiting. and miscellaneous functions was obtained. Data on labor rates, truck costs, and building and equipment costs were obtained from the processors' 1957 financial summaries.

ASSEMBLING LIVE BROILERS

The procedure for assembling live broilers at farms is fairly standardized. The crew, which usually included a foreman or assistant foreman, or both, truck drivers, catchers and passers, assembled at the processing plant at a prearranged time and drove to the farm where the broilers were to be picked up. Upon arrival at the farm trucks were maneuvered into position beside the broiler house, and the crew untied ropes holding crates in place on the trucks and arranged catching pens in the house.

The crew prepared the trucks for loading by beginning at the front end of the truck and removing the first and second tiers of crates except for the bottom layer. Crates removed from the truck were stacked on the ground. When the loading began birds were placed in the bottom layer crates of the first and second tiers, and as the loading continued crates were removed from the third tier, placed in the first tier on the forward end of the truck, and filled with birds. Fourth tier crates similarly ended up where the second tier had been. This procedure was followed until the truck was loaded or until all the birds were removed from the house (figure 1).

After preparations for catching and loading the birds were made, the crew, which usually consisted of 14 men, was divided into two groups of seven. Working from different sections of the broiler house, they drove 200-400 birds into catch pens and the catching began. Two men (catchers) caught 12-14 birds (six or seven per hand) at a time, passing them to three men (passers) who passed them to the packers located on the truck. The packers put the birds in crates and stacked the crates in position on the truck. Twelve and sometimes 14 birds were put in each crate. As soon as one truck was loaded, it was driven to the plant to be unloaded and another truck was placed in position for loading.

a. Start loading

b. Mid-way through the loading

c. Truck nearly loaded

FIGURE 1. The Steps Involved in Loading a Truck with Broilers

COSTS AND LABOR REQUIREMENTS

Labor amounted to 51 per cent of the assembly cost and motor vehicle 36 per cent (figure 2). Coops, buildings and equipment, and

miscellaneous items made up the remaining 13 per cent of the assembly cost. The average cost for assembling live broilers for the three operations studied was 1.99 cents per bird. A breakdown of the average cost for assembling broilers showed 1.02 cents for labor, .72 cent for motor vehicle expense, .05 cent for buildings and equipment, .06 cent for coop expense, and .14 cent for miscellaneous items (table 1). For the three assembling operations studied costs varied from 1.55 cents to 2.39 cents per bird. The average distance from plant to farm for the three assembly operations was 45 miles.

The labor cost included the pay of supervisory employees, foreman, assistant foreman, truck drivers, and pick-up crew members for time expended while traveling from the plant to the farm, while at the farm, while trucking birds to the plant, and transporting the crew back to the plant. The labor charge does not include time spent by the employees before leaving the plant or time spent at the plant after they arrived from the farm. Time spent by the truck drivers while their trucks were unloaded and reloaded with empty crates for a return trip to the farm was included in the labor charge. Motor vehicle, buildings and equipment, and coop expenses included both variable and fixed costs.

TABLE 1. Costs of Assembling Live Broilers
3 Maine Processing Plants, 1957

Item	Assembly costs			
	Average		Range	
	Cents per bird	Cents per pound	Cents per bird	Cents per pound
Labor	1.02	.29	.84 - 1.34	.25 - .37
Motor vehicle	.72	.21	.50 - 1.07	.15 - .32
Bldg. & Equip.	.05	.02	.03 - .10	.01 - .03
Coops	.06	.02	.04 - .14	.01 - .04
Misc.*	.14	.04	.07 - .26	.02 - .07
Total	1.99	.58	1.55 - 2.39	.44 - .83

* Miscellaneous includes—cargo insurance, lights, water, telephone, clerical help, office supplies, fuel oil and a road expense item.

Labor

Labor cost averaged 1.02 cents per bird or 51 per cent of the total cost of assembling live broilers. A breakdown of labor costs includes 24 cents for loading the broilers at the farm, 17 cents for travel by all personnel, 6 cents for waiting, 1 cent for miscellaneous, and 3 cents for supervision (figure 2). Travel and loading time consumed 80 per cent of the crew's time. For the three operations studied labor cost ranged from .84 cent to 1.34 cents per bird or .25 to .37 cent per pound. Labor cost was 54 per cent of one firm's total assembly

costs, 45 per cent of another's and 56 per cent of the third firm's assembly cost.

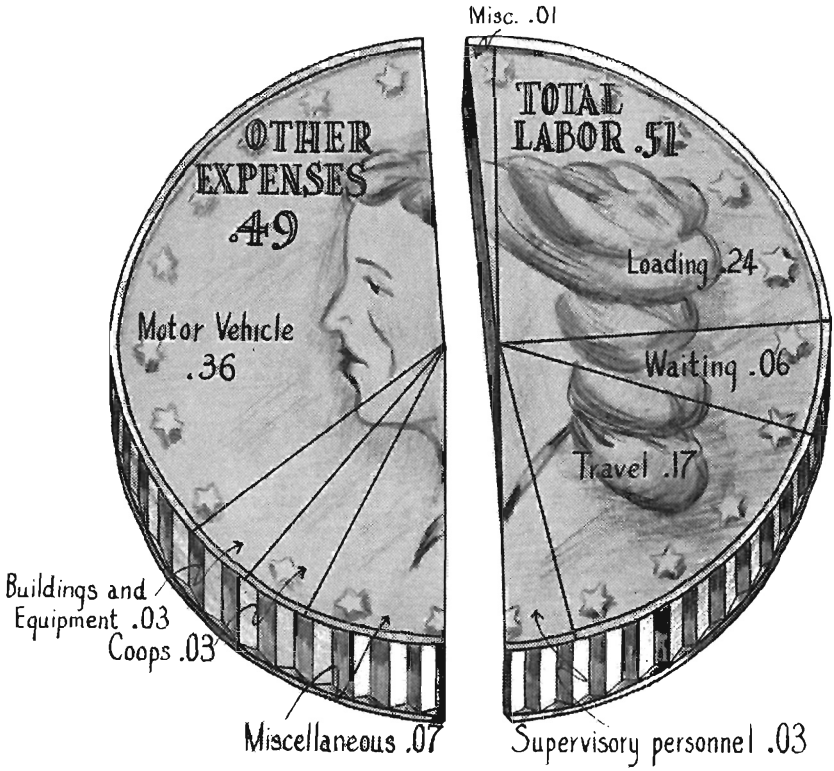

FIGURE 2. Poultry Trucker's Assembly Dollar.

Labor rates paid assembly crew personnel varied according to the type of job and the company's wage scale. The average rate paid all employees was $1.35 per hour (table 2). Average hourly wage rates were $1.58 for foremen, $1.50 for assistant foremen, $1.38 for truck drivers, and $1.27 for all other assembly crew members.

TABLE 2. Hourly Wages of Assembly Crew Personnel
3 Maine Processing Plants, 1957

Job classification	Hourly wages	
	Average	Range
	Dollars per hour	
Foremen	1.58	1.48 - 1.67
Ass't foremen	1.50	1.38 - 1.62
Truck drivers	1.38	1.30 - 1.52
Other assembly members	1.27	1.21 - 1.32
Weighted average	1.35	1.28 - 1.44

Man-hours required for assembling broilers varied from 6.2 to 10.0 per 1000 birds (table 3). The average was 7.0 man-hours per 1000 birds. Man-hours per 1000 birds expended in travel averaged 2.6, for loading 3.4, for waiting .9, and miscellaneous .1 hour. Fifty-four per cent of the assembly labor time was expended on the farm. The remaining 46 per cent was used in travel by all employees and in waiting time at the plant by the truck drivers.

TABLE 3. Labor Requirements for Assembling Live Broilers 3 Maine Processing Plants, 1957

Item	Labor requirements	
	Average	Range
	Man-hours per 1000 birds	
Travel	2.6	2.2 - 3.1
Loading	3.4	3.0 - 5.6
Waiting	.9	.8 - 1.1
Misc.	.1	.1 - .2
Total	7.0	6.2 - 10.0

Of the total time, labor expended by each type of employee in assembling broilers was pick-up crew 68 per cent, truck drivers 24 per cent, assistant foremen 2 per cent and foremen 6 per cent.

The foreman spent an average of 32 per cent of his time traveling, 60 per cent loading, 6 per cent waiting, and miscellaneous 2 per cent. The assistant foreman's time was expended in a similar fashion. Truck drivers spent 45 per cent of their time traveling from plant to farm and return, 32 per cent waiting at the plant, 22 per cent loading birds at the farm, and miscellaneous 1 per cent. Fifty-nine per cent of the pick-up crew's time was expended loading birds at the farm, 33 per cent traveling to and from the farm, 2 per cent waiting and 6 per cent on miscellaneous jobs.

Time expended on waiting and loading is one of the best criteria for measuring crew efficiency. Man-hours expended on these jobs averaged 4.3 man-hours per 1000 birds and ranged from 3.8 to 6.7 (table 3).

Man-hours expended in loading by type of employee were divided in the following manner: pick-up crew, 80 per cent; truck drivers, 11 per cent; assistant foreman, 2 per cent; and foreman, 7 per cent. The .9 of a man-hour that was spent waiting before starting work at the farm, waiting for the trucks to be maneuvered into position for loading at the farm, and waiting for the trucks to be unloaded at the plant was consumed as follows: pick-up crew, 32 per cent; truck drivers, 64 per cent; assistant foreman, 1 per cent; and foreman, 3 per cent.

Labor expended on travel can be directly related to the distances

from plant to farm. The average distance from plant to farm for the three assembly operations was 45 miles. Sixty-two per cent of the man-hours expended on travel was consumed by the pick-up crew, 30 per cent by truck drivers, 2 per cent assistant foreman, and 6 per cent foreman.

Motor vehicle

Three types of motor vehicles used in the assembly operations were platform trucks, tractors and semi-trailers, and a "carry all," which was used for transporting the pick-up crew members. The platform truck with an over-hang above the cab had a capacity of 192 crates. The tractor with semi-trailer carried 320 crates.

Data on truck costs were obtained from the processors' annual operating statements. These costs were divided into two categories: (1) variable costs, which includes gas, oil, grease, tires, tubes, repair, and maintenance; and (2) fixed costs, which includes taxes, licenses, insurance, depreciation, and interest on investment. Interest on investment was charged at the rate of 6 per cent per year applied to the undepreciated value of the trucks. The costs were divided by the total number of miles driven during the year in order to arrive at the average cost per mile.

Motor vehicle costs averaged .21 cent per pound, .72 cent per bird or 24.5 cents per mile. This amounted to 36 per cent of the total assembly cost. Vehicle costs per mile for the 3 operations studied varied from a high of 38.8 cents to a low of 16.0 cents (table 4). Variable costs, which are primarily a function of distance traveled, averaged

TABLE 4. Motor Vehicle Costs Per Mile for Assembling Live Broilers
3 Maine Processing Plants, 1957

Item	Motor vehicle cost per mile	
	Average	Range
	Cents per mile	
Variable costs:		
Gas, oil, grease	7.3	5.2 - 10.2
Tires and tubes	2.3	.8 - 3.5
Repair and maintenance	4.5	2.5 - 6.8
Motor vehicle main.—labor	1.8	.7 - 4.0
Total	15.9	9.6 - 23.2
Fixed costs:		
Taxes—includes licenses	1.5	1.0 - 1.9
Insurance	1.3	.7 - 2.4
Depreciation	4.4	2.2 - 8.4
Interest on investment	1.4	.7 - 2.9
Total	8.6	6.4 - 15.6
Grand Total	24.5	16.0 - 38.8

15.9 cents per mile; and fixed costs, which are primarily a function of time, averaged 8.6 cents per mile.

The wide variation in truck costs was due mainly to differences in types of trucks used in the assembly operation. Firms using a high proportion of tractor semi-trailer combinations had relatively higher operating costs (high variable costs and depreciation allowances) per mile, per bird and per pound than firms using mostly platform trucks.

The following quotation exemplifies some of the problems in calculating truck costs—"The exact costs of operating any given truck will be affected by many factors such as size, make, age of the truck, the speed at which the truck is driven, and the skill of the driver. It is common knowledge that trucks identical in size, make, and age will not give identical performances. Even more variation will be found between trucks of the same size and capacity but of varying makes and ages. In spite of these discrepancies, it is undoubtedly true that there is a general pattern in truck costs." [3]

Coops, buildings and equipment, and miscellaneous

Coops and building and equipment expense each accounted for 3 per cent of the total assembly cost, and miscellaneous expenses made up 7 per cent of the total. As shown in table 1, coop expense per bird was .06 cent, building and equipment expense per bird was .05 cent, and miscellaneous expense per bird was .14 cent.

Coop expense included a charge for depreciation based on a 2½ year amortization of the original investment; a charge for maintenance which includes labor and supplies, insurance, taxes, and a 6 per cent interest charge on the average yearly investment in coops.

A rental fee for the use of the buildings used for storing and repairing the trucks and coops made up the building expense. Equipment expense included a charge for the equipment used for repairing and maintaining the trucks and coops and for the equipment used in picking up the birds, such as the catching pens, rope used to tie down the crates on the truck, tarpaulin to cover the load, and other expenses. Included in the building and equipment expense item are a 6 per cent interest on investment charge, a depreciation allowance for the equipment and buildings, taxes, insurance fees, and the cost of maintaining the buildings and equipment.

The cost of damage to a farmer's buildings, road and bridge tolls, repairs to the equipment while away from the trucker's repair shop,

[3] R. G. Bressler, Jr. and D. O. Hammerberg, *Efficiency of Milk Marketing in Connecticut*, Economics of the Assembly of Milk, Storrs Agricultural Experiment Station, University of Connecticut, Bulletin 239, p. 33, 1942.

and the cost of feeding the crew while on the road make up an item called "road expense." Road expense cost was .01 cent per bird. This item is included in the miscellaneous category. Other miscellaneous expenses were fuel oil, lights, water, telephone, clerical help, office supplies, cargo insurance, and the Maine franchise tax. The average cost of clerical help and office supplies was .07 cent per bird. Telephone cost was .01 cent per bird and cargo insurance was about .005 cent per bird.

FACTORS AFFECTING ASSEMBLY COSTS AND LABOR EFFICIENCY

This section includes an analysis of some of the more important factors affecting the efficiency and costs of assembling broilers for processing. The factors considered were crew organization, type of broiler house, load-out facilities, size of flock, distance from farm to plant, and weight loss.

Assembly Crew

The crews included in this study were typical of those used for assembling live broilers in Maine. Time expended on loading the birds at the farm and waiting time are probably the best measures of crew efficiency. The average number of man-hours required for loading was 3.4 per 1000 birds and varied from 3.0 to 5.6 man-hours per 1000 birds (table 3). The idle time that the pick-up crew had at the farm and the truck drivers had at the farm and at the plant was called waiting time. Waiting time averaged .9 man-hour and ranged from .8 to 1.1 man-hours per 1000 birds. The method of scheduling trucks to the plant and organization of the crew by the foreman were reasons for the variations in efficiencies among assembly crews.

Type of broiler house

Four different types of broiler houses were considered in the analysis of the effect of type of house on costs and efficiency. The four types of houses were 3- and 4-story broiler houses, 1- and 2-story houses, converted dairy barns, and a combination of a converted barn with broiler house attached. Man-hours expended for loading and waiting were used to measure the effect of type of house on labor cost and efficiency.

It required 3.3 man-hours per 1000 birds to load from 1- and 2-story broiler houses compared to 4.4 man-hours for the combination converted barn-broiler house (table 5). Man-hours expended for loading were the same for converted barns and 3- and 4-story broiler

TABLE 5. Effect of Type of Broiler House on Man-Hour Requirements for Assembling Live Broilers 3 Maine Processing Plants, 1957

Item	1 & 2 story broiler house	Converted barn	3 & 4 story broiler house	Comb. converted barn-broiler house
	Man-hours per 1000 birds			
Waiting	.8	.9	.8	1.0
Loading	3.3	3.6	3.6	4.4
Misc.	.1	.1	.2	.1
Total	4.2	4.6	4.6	5.5

houses averaging 3.6 man-hours per 1000 birds. Idle or waiting time and miscellaneous were about the same for all types of houses.

Birds were easily passed from the 1- and 2-story houses to the packer on the truck. Birds removed from the third and fourth stories either had to be passed through scuttle holes to men on the second floor or coops had to be tiered on the outside of the building to the third or fourth story. The birds were handed to a passer on top of the coops who passed them to a packer on the truck below. These were very awkward tasks and resulted in poor labor efficiency.

Load-out facilities

There were four different types of load-out facilities for removing broilers from the broiler house. One arrangement involved openings 2 x 3 feet or larger located at least every 12 feet along the load-out side of the building. This was the most efficient set-up. Man-hours per 1000 birds expended on the loading operation with this arrangement were 3.3 (table 6). Another type had openings smaller than 2 x 3 feet located at least every 12 feet along load-out side of building. A third type of load-out facility had one load-out door on the side

TABLE 6. Effect of Load-Out Facilities on Man-Hour Requirements for Assembling Live Broilers 3 Maine Processing Plants, 1957

Item	Load-out facilities*			
	1	2	3	4
	Man-hours per 1000 birds			
Waiting	.81	.88	1.20	.83
Loading	3.30	4.22	4.39	3.96
Misc.	.15	.01	.08	.16
Total	4.26	5.11	5.67	4.95

*Load-out facilities:
[1] Two by three feet, or larger, openings located every 12 feet along load-out side of building.
[2] Openings smaller than 2 x 3 feet located every 12 feet along load-out side of buildings.
[3] One load-out door on side or end of building.
[4] A combination of doors or windows and scuttle holes on end and/or side of building.

or at the end of the building. The second and third types were the most inefficient, requiring 4.22 and 4.39 man-hours per 1000 birds for loading, respectively. A fourth type of load-out facility had a combination of doors and/or windows and scuttle holes on the end and/or side of the building. Labor expended with these types of facilities was 3.96 man-hours per 1000 birds.

With the first and most efficient type facility two to four trucks lined up along the side of the building and were loaded at the same time. Birds were easily passed through the large openings to packers on the truck. Trucks were also lined up along the sides of buildings in the second category but the passers had difficulty getting birds through the small openings. When load-out openings were located at intervals along the side of the building rather than at the end the birds did not have to be driven such long distances.

When there was one load-out door or window located on the side or end of the building, the pick-up crews had to drive the birds long distances to the catching pens or the passers had to carry the birds long distances to the packer on the truck. Both of these methods wasted time. Passing birds through the scuttle holes from the upper floors of 3- and 4-story houses to men on the floors below was also an awkward and time-consuming procedure.

Size of flock

Broiler flocks were grouped in three sizes to determine the effect of size of flock on assembly costs and labor requirements. The size groups were (1) less than 10,000 birds, (2) 10,000 to 19,999 birds, and (3) 20,000 birds and over. Motor vehicle and labor costs are the best measures to use in determining the effects of size of flock on cost of assembling live broilers.

Man-hour requirements per 1000 birds for hauling broilers from farm to plant and for transporting the crew from plant to farm and return greatly decreased as flock size increased. Labor expended for travel averaged 4.79 man-hours per 1000 birds for flocks under 10,000 birds, 3.29 for flocks with 10,000 to 19,999 birds, and 1.63 for flocks with 20,000 birds and over (table 7). The average distance from plant to farm was approximately the same for the different size flocks. The basic cause for the larger labor expenditure on travel for the smaller flocks was the ratio of man-hours expended in travel by the assembly crew and the number of birds picked up by the crew. Time spent on travel by the crew is determined by the distance. The more birds that can be picked up after arrival at the destination, the smaller the per bird labor expenditure.

TABLE 7. Effect of Size of Flock on Man-Hour Requirements for Assembling Live Broilers
3 Maine Processing Plants, 1957

Item	Flock Size			
	Less than 10,000	10,000-19,999	20,000-over	Average all flocks
	Man-hours 1000 birds			
Travel	4.79	3.29	1.63	2.62
Waiting	1.05	.90	.82	.91
Loading	3.90	3.92	3.40	3.43
Misc.	.14	.05	.18	.10
Total	9.88	8.14	6.03	7.06

Loading requirements per 1000 birds were not affected by flock size below 20,000 birds. Labor expended on loading was 3.90 man-hours per 1000 birds for flocks less than 10,000 birds and 3.92 for flocks 10,000 to 19,999. For the large flocks, 20,000 birds and over, only 3.40 man-hours per 1000 birds were required for loading. There were two reasons for the better efficiency with larger flocks. First, there was generally less moving from floor to floor, resulting in less unproductive labor. This is indicated in table 7 under waiting time. Second, when picking up larger flocks, crews seemed to be more enthusiastic about getting the job done. When picking up small flocks, the crews frequently would slow down on the job in an effort to get in more working hours. Apparently there was no need for slowing down when picking up the larger flocks because they were guaranteed a good day's work.

Assembly crew labor costs were 38 per cent lower for flocks over 20,000 than for flocks less than that number. Labor costs per bird were 1.36 cents for flocks with less than 10,000 birds, 1.14 cents for flocks with 10,000 to 19,999 birds, and .85 of a cent for flocks with 20,000 birds and over (table 8).

TABLE 8. Effect of Size of Flock on Cost of Assembling Live Broilers
3 Maine Processing Plants, 1957

Item	Flock size			
	Less than 10,000	10,000-19,999	20,000-over	Average all flocks
	Cents per bird			
Labor	1.36	1.14	.85	1.02
Motor vehicle	1.07	.86	.53	.72
Bldg. & Equip.	.06	.05	.05	.05
Coops	.08	.07	.06	.06
Misc.	.15	.14	.14	.14
Total	2.72	2.26	1.63	1.99

Motor vehicle costs also decreased appreciably as flock size increased (table 8). Truck costs per bird were 50 per cent less for flocks with 20,000 birds and over than for flocks with less than 10,000 birds. Flocks with less than 10,000 birds had a per bird motor vehicle expense of 1.07 cents, flocks with 10,000 to 19,999 birds had costs of .8 cent and flocks with 20,000 or more birds had vehicle costs of .5 cent per bird (table 8).

Distance from plant to farm

The distance between the farm and the processing plant affects truck and labor costs of assembling broilers. Farm pick-ups were grouped according to distance from processing plant to the farm for the purpose of determining the effect of distance on the assembly operation. Labor and truck costs for farms 1 to 25 miles from the plant were 1.13 cents per bird; farms 26 to 50 miles from the plant, 1.71 cents per bird; and farms 51 miles or more from the plant, 2.62 cents per bird (table 9).

TABLE 9. Effect of Distance from Plant to Farm on Cost of Assembling Live Broilers
3 Maine Processing Plants, 1957

Item	1 - 25 miles	26 - 50 miles	51 and over
		Cents per bird	
Labor	.81	.95	1.43
Truck	.32	.76	1.19
Total	1.13	1.71	2.62

The average number of man-hours per 1000 birds expended in travel was 1.39 for those farms in the 1 to 25 mile group, 2.17 in the 26 to 50 mile group, and 5.04 in the more than 51 mile group (table 10). For all farm pick-ups studied travel time averaged 2.61 man-hours per 1000 birds.

TABLE 10. Effect of Distance from Plant to Farm on Man-Hour Requirements for Assembling Live Broilers
3 Maine Processing Plants, 1957

Item	Miles from plant to farm			
	1 - 25	26 - 50	51 and over	Avg. all distances
		Man-hours per 1000 birds		
Travel	1.39	2.17	5.04	2.61
Waiting	.86	.80	1.03	.87
Loading	3.46	3.43	4.39	3.67
Misc.	.10	.17	.06	.12
Total	5.81	6.57	10.52	7.27
Avg. no. miles	17.9	35.9	68.7	37.8

Weight losses

The loss in weight in moving live broilers from the farm to plant represents a problem and an important cost. To determine the loss of weight, sample lots of birds were weighed prior to leaving the farm and weighed again when they reached the plant. Breed and strain of the birds were held constant when making these tests. Weight loss or shrink from farm to plant averaged 1.27 per cent of the live weight of the birds (table 11). For flocks 1 to 25 miles from the plant the shrink was 1.12 per cent, 25 to 50 miles, 1.13 per cent, and 1.52 per cent for flocks more than 50 miles from the plant.

Maine poultry processors processed approximately 188,550,895 pounds of broilers (live weight at the plant) in 1957.[4] Based upon a 19 cents per pound farm price for broilers and an average farm to plant shrink of 1.27 per cent this amounts to a loss of $460,825 to the Maine broiler industry. Some weight loss is expected when transporting birds from farm to plant, but any improvements that can be made in this area would be an economic boost to the industry.

TABLE 11. Weight Loss When Transporting Live Broilers from Farm to Plant
2 Maine Processing Plants, 1957

Item	Miles from farm to plant			
	1 - 25	26 - 50	51 and over	Average
Number of birds	96	180	159	435
Avg. wt. of birds at farm	3.53	3.58	3.51	3.54
Per cent shrink	1.12	1.13	1.52	1.27

Time lapse between weighings averaged one hour and twenty-six minutes for flocks located 1 to 25 miles from the plant, two hours and four minutes for flocks located 26 to 50 miles from the plant, and three hours and eight minutes for flocks located over 50 miles from the plant. The average distances traveled in the three groups was 18, 39, and 81 miles respectively.

During the test period relative humidity averaged 70 per cent and temperatures ranged from 55 to 75 degrees fahrenheit. The average temperature was 65 degrees.

[4] Richard F. Saunders, *The Impact of the Broiler Industry on Maine's Economy*, Progress Report No. 1, June, 1958.

Research work conducted by the Connecticut Agricultural Experiment Station showed similar shrinkage results.[5]

REDUCING COSTS AND IMPROVING LABOR EFFICIENCY

Many factors affect assembly costs and efficiency. In this study organization of the assembly crew, type of broiler house, load-out facilities, distance from farm to plant, and flock size are factors that have been considered.

The organization of the assembly crew and the scheduling of farm pick-ups are important factors in the efficiency of the operation. A foreman who knows his job and who trains and supervises his crew will see that crew members are preparing the house for catching birds while the truck-drivers are backing the trucks into loading position. An efficient foreman will organize the work of the crew so that all its members are busy during the loading operation.

The truck drivers' waiting time at the processing plant was frequently too long for efficiency. This wasted time could be reduced by improving the scheduling of truck arrivals at the plant. Enough loaded trucks have to be waiting at the plant to assure continuous operation, but drivers of loaded trucks in excess of that requirement could well be held back at the farm to help with the loading operation.

The use of fork-lift trucks would speed up the unloading of loaded crates and reloading of empties and cut down on each truck driver's waiting time at the plant. The time that birds are on the trucks and exposed to climatic conditions would be reduced.

The combined effect of such factors as size of flock, distance from plant to farm, type of broiler house, and load-out facilities on assembly costs and labor efficiency is shown in table 12. A comparison is made between the ten lowest cost farm pick-ups and the ten highest cost pick-ups. For the ten lowest cost farm pick-ups assembly costs averaged 1.49 cents per bird. An average of 5.44 man-hours per 1000 birds was required to assemble the birds. In contrast an average of 3.48 cents per bird and 11.85 man-hours per 1000 birds was required for the ten highest cost farm pick-ups.

The ten lowest cost pick-ups involved flocks that ranged in size from 20,000 to 40,000 birds located within a 35-mile radius of the processing plant. The broiler houses were 2- and 3-story buildings constructed specifically for rearing broilers, and each house had load-out doors at least 2 by 3 feet spaced at least 12 feet apart along the load-out side of the house (figure 3).

[5] R. A. King and C. J. Zwick, *Competitive Position of the Connecticut Poultry Industry.—4. Shrinkage of Live Poultry between Farm and Plant*, Bulletin 270, October, 1950.

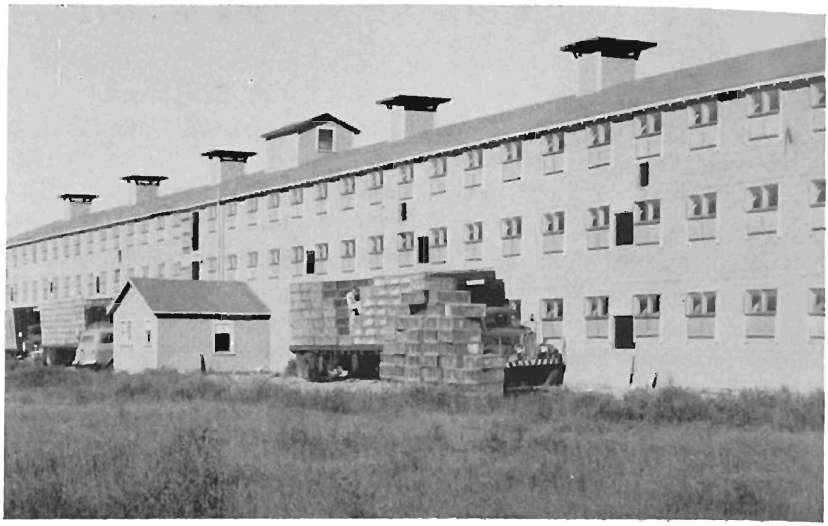

FIGURE 3, top, good load-out facilities contributed to low pick-up costs at this farm; figure 4, left, poor load-out facilities made this farm one of the high pick-up cost group.

Where the pick-up costs were highest, the flocks were small averaging 8,270 birds and ranging from 4,000 to 10,000 birds. The farms were located 60 to 80 miles from the plant with the average length of haul being 68.5 miles. The broiler buildings were converted barns and 4-story broiler houses with inadequate load-out facilities such as an end door or only one door along the side of the building (figure 4).

Travel labor and motor vehicle expense could be reduced substantially if processors would consolidate their flocks in the vicinity of their processing plants. Considerable overlapping and duplication of pick-up routes exist (figure 5).

TABLE 12. Combined Effect of Factors on Assembly Costs and Labor Efficiency
3 Maine Processing Plants, 1957

Item	10 lowest cost pick-ups	10 highest cost pick-ups
Factors considered:		
Size of flock	25,074	8,270
Distance plant to farm (miles)	17.4	68.5
Type of broiler houses	2 and 3 story broiler houses	converted barns and 4 story broiler houses
Load-out facilities	2 x 3 foot doors, 12 feet apart	end or one side door
	Cents per bird	
Cost:		
Labor	.85	1.63
Motor vehicle	.36	1.45
Bldg. & equip.	.07	.08
Coop	.05	.06
Miscellaneous	.16	.26
Total	1.49	3.48
	Man-hours per 1000 birds	
Labor efficiency:		
Travel	1.31	6.30
Loading	3.15	4.33
Waiting	.80	1.17
Miscellaneous	.18	.05
Total	5.44	11.85

Correcting the situation mentioned in the previous paragraph would reduce labor and truck costs involved in picking up birds for delivery to the processing plants. Reducing the criss-crossing of delivery paths would also reduce the costs of flock supervision and the expenses involved in delivering litter, grain, and other poultry supplies to the farms.

Even without any major change in location of flocks, processors could reduce travel time of pick-up crew members by planning for flocks from the same general area to reach maturity and to be trucked to the plant on the same day.

When load-out facilities are inadequate, it may be possible to increase the size and number of load-out openings in the poultry houses. By increasing these it would be possible to reduce the amount of time and effort required to load broilers. Multiple load-out doors also would provide an opportunity for loading more than one truck at a time and for loading trailer trucks from both the front and the rear.

The results of this study have shown the importance of size of flock. From this the question might arise—"Just how large will the broiler producing unit of tomorrow be?" One might even suggest that an efficient set up of the future will consist of a "broiler factory" located adjacent to or as a part of a plant. Live birds would be hung on a

conveyor line which would carry them to the processing plant. A part of such a complex would be storage facilities for litter, feeds and other materials necessary to the operation. This set-up would practically eliminate all assembly costs. The cost of flock supervision and grain delivery to farms would be reduced substantially.

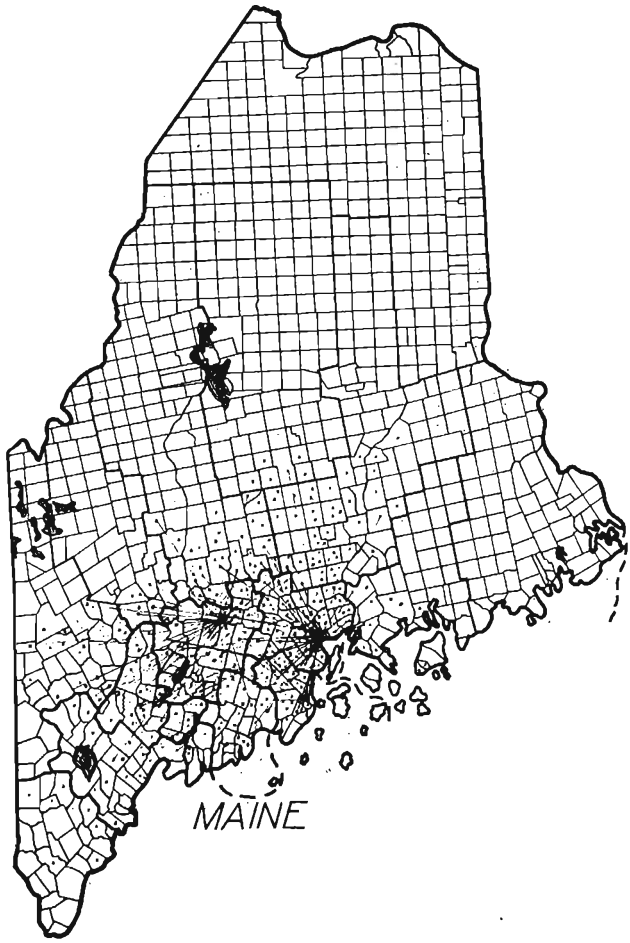

FIGURE 5. Location of Broiler Processing Plants and Their Supply Flocks